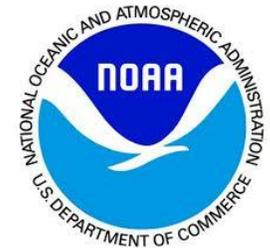


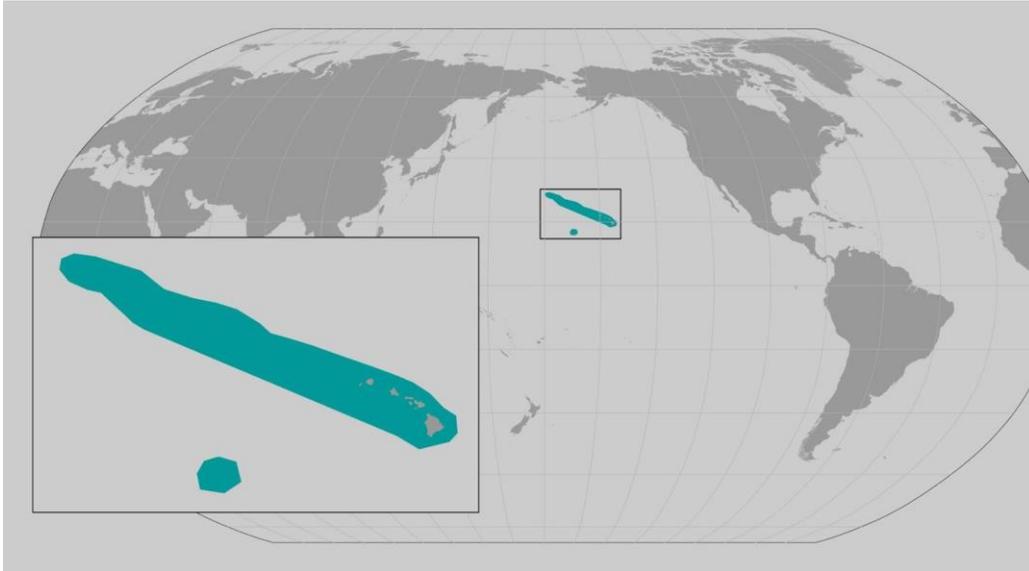


Hawaiian Monk Seal Research Program, exemplar of successful conservation medicine approaches

Michelle Barbieri, Jason Baker, Frances Gulland, Teri Rowles, Angela Amlin, Brenda Becker, Jessie Bohlander, Claudia Cedillo, Nicole Davis, Albert Harting, John Henderson, Thea Johanos, Angie Kaufman, Liz Kashinsky, Frankie Koethe, Christy Kozama, Diana Kramer, Tracy Mercer, Mimi Olry, Jon Schneiderman, Mark Sullivan, Jamie Thomson, Stacie Robinson, Hope Ronco, Jeff Walters, Sophie Whoriskey, Charles Littnan



Hawaiian Monk Seals



Endangered

1 of 2 mammals endemic to Hawai'i

Only coral reef associated seal

Only *living* species of *Neomonachus*

Population size (2022):

1,607 and increasing at average 2%/year since 2013

Applied Conservation Medicine

OBSERVATIONAL
DATA

POPULATION
HEALTH
SURVEILLANCE



INTERVENTIONS



Applied Conservation Medicine

OBSERVATIONAL DATA

- Field researchers, partners, citizen scientists
- Behavior, body condition, wounds, discharge
- Informs scale, outcomes, emerging trends
- Pair with other data (reproductive history, strandings, environmental data)

POPULATION HEALTH SURVEILLANCE



INTERVENTIONS



Applied Conservation Medicine

OBSERVATIONAL DATA



POPULATION HEALTH SURVEILLANCE

- Standard sample collection protocols: blood, swabs, tissues
- Analyze for most likely pathogens: Histopathology, molecular analysis, serology, etc.
- Archive for longitudinal studies, non-standard screening, future questions (*e.g.*, avian influenza)

INTERVENTIONS



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OBSERVATIONAL
DATA

POPULATION
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INTERVENTIONS

Monitor/mitigate/benign neglect
Conduct health surveillance
(live/dead animal sampling)
Design strategies (*e.g.*, vaccination)



A Looming Threat: Morbillivirus

No prior exposure

Small population

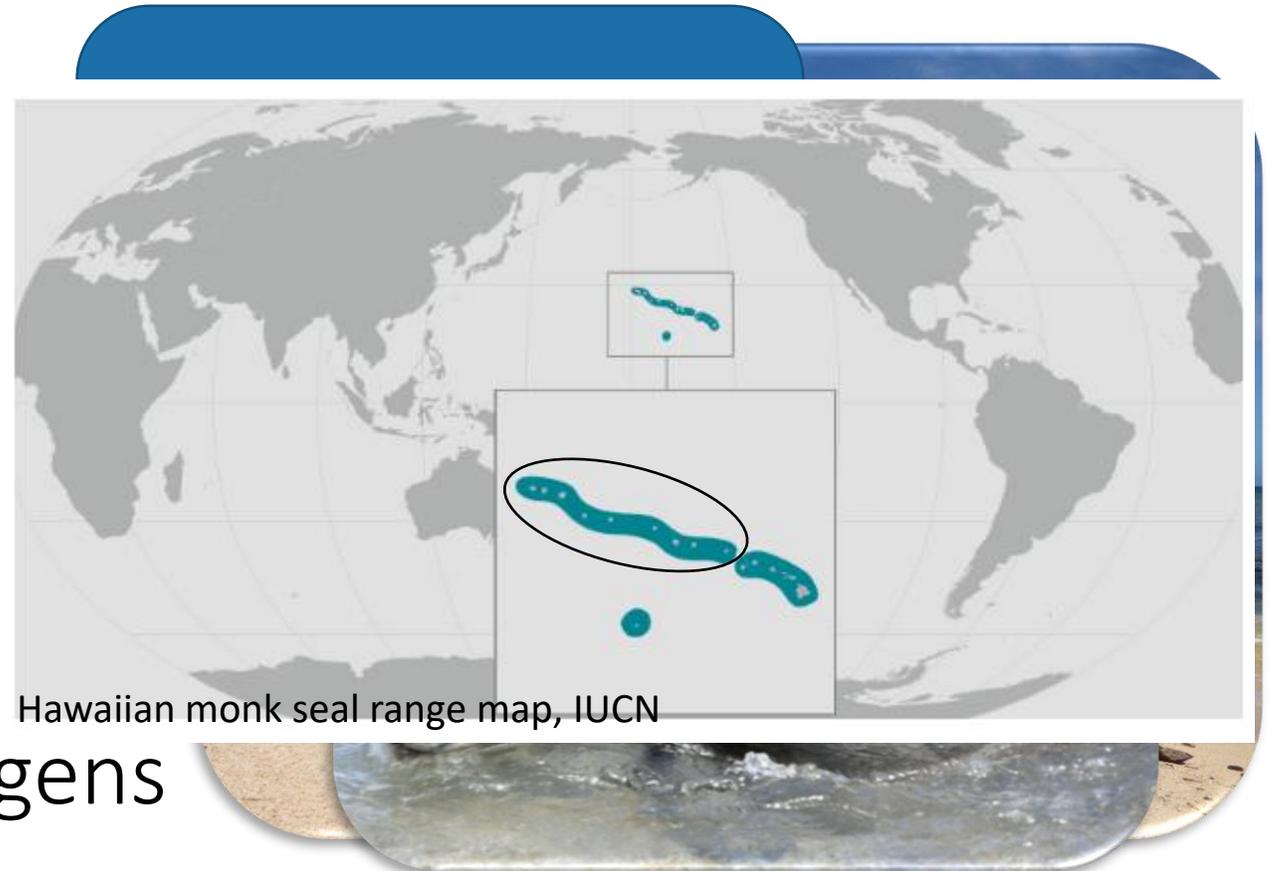
Poor genetic diversity

Stranded cetaceans

Unvaccinated dogs

Remote area

Climate change & pathogens



Hawaiian monk seal range map, IUCN

Implementing a Vaccination Program



Epidemiological modeling

Contact sufficient for outbreak
Prophylactic vaccination essential
Baker et al. 2016,2017; Robinson et al. 2018

Implementing a Vaccination Program



Epidemiological modeling

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Since 2016

No adverse reactions
>1,800 injections
>900 seals vaccinated

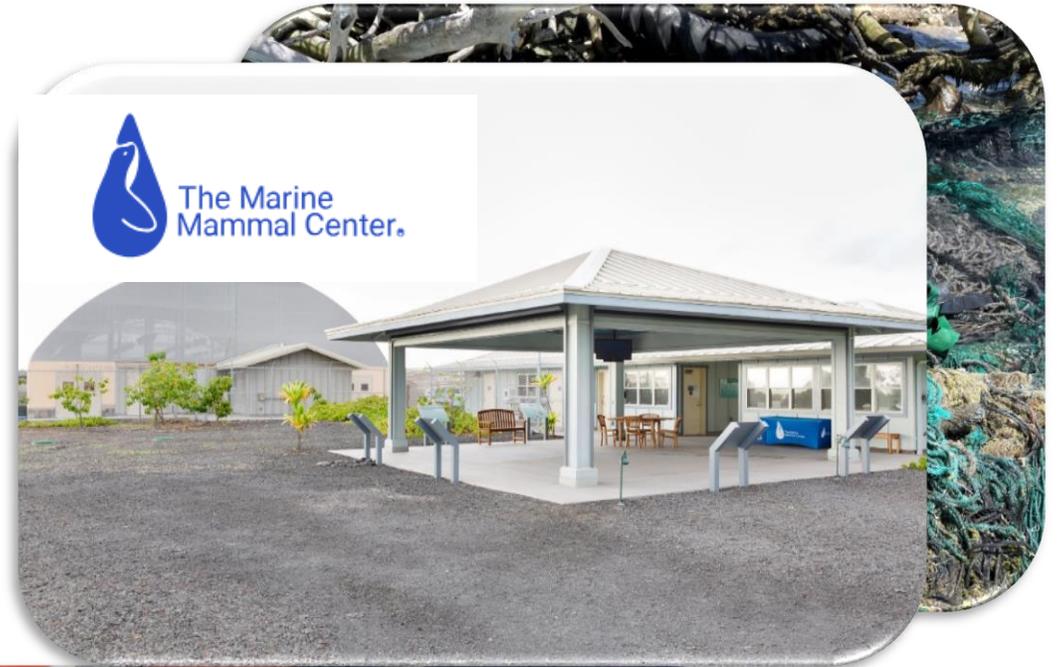


Future

Early detection
Point of care diagnostic testing
Other taxa, new disease threats

Individual interventions

- Remove fishing gear
- Disentanglement from marine debris
- Antibiotics for infections
- Deworming
- Treat abscesses
- Reunite mom-pup pairs
- Detach placenta
- Survival-enhancing translocations
- Field radiography (x-rays)
- Rehabilitation



Payoff of Interventions



1980-2012:
Approximately 1/3 of the
Hawaiian monk seal
population is the result of
survival-enhancing
interventions
(or their offspring).

Harting et al. 2014 Endang Spec Res

Proactive approaches, multiple stressors



Mahalo

Countless seasonal field biologists!

Hawai'i Marine Animal Response

Kaua'i Monk Seal Hui

Papahānaumokuākea Marine Debris Project

Papahānaumokuākea Marine National Monument

NOAA Marine Mammal Health & Stranding Response Program

State of Hawai'i Dept. of Land and Natural Resources

The Marine Mammal Commission

The Marine Mammal Center and Ke Kai Ola

UC Davis Marine Ecosystem Health Diagnostic & Surveillance Lab

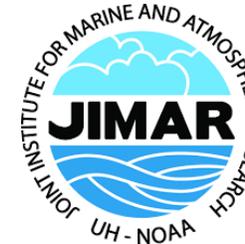
UH Cooperative Institute for Marine & Atmospheric Research

U. of Illinois Zoological Pathology Program

U. of Georgia College of Vet Med

US Fish and Wildlife Service

Photos: NOAA NMFS Permit 22677, 10137, 16632, 932-1905



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INTERVENTIONS

